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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,758	09/26/2003	Jean-Laurent Pradel	FR-AM1888 NP	9320

31684 7590 10/04/2007  
ARKEMA INC.  
PATENT DEPARTMENT - 26TH FLOOR  
2000 MARKET STREET  
PHILADELPHIA, PA 19103-3222

EXAMINER
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PATTERSON, MARC A

ART UNIT	PAPER NUMBER
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1772

MAIL DATE	DELIVERY MODE
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10/04/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



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GROUP 1700

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/671,758  
Filing Date: September 26, 2003  
Appellant(s): PRADEL ET AL.

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Thomas F. Roland  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed July 2, 2007 appealing from the Office action mailed July 26, 2007.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,528,587 B1	ROBERT et al.	3-2003
1,136,536	ROBERT et al.	9-2001
1,136,536	ROBERT et al. (English translation)	9-2001

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 10 and 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robert et al (European Patent No. 1136536).

U.S. Patent No. 6,528,587 B2 is used for translation. With regard to Claims 1 – 2, 5, and 12 – 14, Robert et al disclose a coextrusion tie (coextrusion binder; column 1, lines 7 – 9) which comprises 5 to 35% by weight of a polymer itself composed of a blend of 80 to 20% by weight of a metallocene polyethylene with a density of between 0.863 and 0.915 g/cm<sup>3</sup> and 20 to 80% by weight of a non – metallocene LLDPE polyethylene, the blend of polymers being cografted by a carboxylic acid, the content of the grafting monomer in the blend being between 600 and 5,000 ppm, and 95 to 65% by weight of a polyethylene, the total therefore forming 100%, the blend of the polymers being such that its melt flow index is between 1 and 13 g/10 min; the non – metallocene polyethylene has a density of 0.900 g/cm<sup>3</sup> (column 3, lines 7 – 9); the polyethylene is a metallocene polymer (column 4, lines 33 – 34) having a density of 0.863 and 0.915 g/cm<sup>3</sup> (column 4, lines 52 – 55) and is a copolymer of ethylene with a comonomer having 4 carbon atoms (column 2, lines 33 – 36). With regard to Claims 1 – 2, 5, and 12 – 14, Robert fails to disclose a polyethylene homopolymer having a melt flow index of between 3 and 15 g/10 min. However, Robert discloses a melt flow index of the polyethylene homopolymer which is

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selected to produce a blend having a melt flow index of between 0.1 and 10 g/min (the blend has a melt flow index of between 0.1 and 10 g/min; column 1, lines 51 – 52).

Therefore, one of ordinary skill in the art would have recognized the utility of varying the melt flow rate of the metallocene polyethylene homopolymer and the blend without the polyethylene homopolymer to obtain the desired melt flow rate of the blend. Therefore, the melt flow rate of the blend would be readily determined by through routine optimization of the melt flow rate of the metallocene polyethylene homopolymer and the blend without the polyethylene homopolymer by one having ordinary skill in the art depending on the desired use of the end product as taught by Robert et al.

It therefore would be obvious for one of ordinary skill in the art to vary the melt flow rate of the metallocene polyethylene homopolymer, thus determining whether the blend has an increase in adhesive strength of 5 to 50% after 8 days, in order to obtain the desired melt flow rate of the blend, since the melt flow rate of the blend would be readily determined through routine optimization by one having ordinary skill in the art depending on the desired end result as shown by Robert et al.

With regard to Claim 3, Robert et al disclose a grafting monomer comprising maleic anhydride (column 3, lines 14 – 19).

With regard to Claim 4, Robert et al disclose the interchangeable use of metallocene and ethylene alkyl methacrylate copolymer (column 4, lines 26 – 34) and therefore disclose a tie which additionally comprises ethylene / alkyl methacrylate copolymer.

With regard to Claims 6 – 8, Robert discloses a structure comprising the tie directly between a layer of ethylene vinyl alcohol and a layer of polyester (column 2, lines 7 – 18).

With regard to Claims 9 – 10, the structure disclosed by Robert et al is comprised in a container (fuel tank; column 4, lines 65 – 67), therefore a structure.

**(10) Response to Argument**

Appellant argues that if Robert et al (European Patent No. 1136536), is applied as prior art, the terminal disclaimer of April 29, 2005 ceases to function in the manner anticipated in the law; the purpose of the terminal disclaimer is frustrated, Appellant argues, unless all of the affected patents, including the foreign equivalents of the disclaimed patent having the same priority date, are tied together.

However, because one of the foreign equivalents, European Patent No. 1136536, was published more than one year before application for patent in the United States, European Patent No. 1136536 precludes the issuance of a patent under 35 U.S.C. 102(b), despite the filing of a terminal disclaimer to obviate a rejection of the equivalent United States patent. The terminal disclaimer of April 29, 2005 clearly does not cease to function in the manner anticipated in the law, as the law includes 35 U.S.C. 102(b).

Appellant also argues that there is no limit on the length of time that can be terminally disclaimed and that the application of Robert et al (European Patent No. 1136536) is against public policy and international treaties, and would lead to the invalidation of many United States patents and make a mockery of the terminal disclaimer and examination process.

However, as stated above, despite the filing of the terminal disclaimer, European Patent No. 1136536 precludes the issuance of a patent under 35 U.S.C. 102(b), because European Patent No. 1136536 was published more than one year before application for patent in the United

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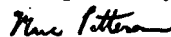
States. Because public policy and international treaty considerations are clearly within the scope of the statute, the invalidation of a United States patent under 35 U.S.C. 102(b) based on a foreign equivalent that meets the statute would not harm the terminal disclaimer or examination processes.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

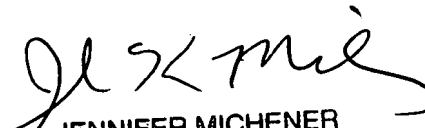


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PTO 05-1665

European Patent Application  
Document No. 1,136,536

COEXTRUSION BINDER BASED ON COGRAFTED METALLOCENE POLYETHYLENE  
[LIANT DE COEXTRUSION A BASE DE POLYETHYLENE METALLOCENE  
COGREFFE]

UNITED STATES PATENT AND TRADEMARK OFFICE  
Washington, D.C. January 2005

Translated by: Schreiber Translations, Inc.



<u>Country</u>	:	France
<u>Document No.</u>	:	1,136,536
<u>Document Type</u>	:	European Patent Application
<u>Language</u>	:	French
<u>Inventor</u>	:	P. Robert, C. Leroy, J. Pascal
<u>Applicant</u>	:	Atofina
<u>IPC</u>	:	C 09 J 123/02
<u>Application Date</u>	:	.03162001
<u>Publication Date</u>	:	09262001
<u>Foreign Language Title</u>	:	LIANT DE COEXTRUSION A BASE DE POLYETHYLENE METALLOCENE COGREFFE
<u>English Title</u>	:	COEXTRUSION BINDER BASED ON COGRAFTED METALLOCENE POLYETHYLENE

## COEXTRUSION BINDER BASED ON COGRAFTED METALLOCENE POLYETHYLENE

Abstract

The present invention concerns a coextrusion binder that includes:

- 5 to 35 parts of a polymer (A) itself comprised of a mixture of 80 to 20 parts of a metallocene polyethylene (A1) with density between 0.865 and 0.915 and from 20 to 80 parts of a non-metallocene LLDPE polyethylene (A2), the mixture of (A1) and (A2) being cografted by an unsaturated carboxylic acid,
- 95 to 65 parts of a polyethylene (B) chosen among homo- or copolymer polyethylenes and elastomers, the mixture of (A) and (B) being such that:
  - the grafted unsaturated carboxylic acid content is between 30 and 100,000 ppm,
  - the MFI or melt flow index MFI (ASTM D 1238 standard, at 190°C, under a load of 2.16 kg) is between 0.1 and 10 g/10 minutes.

The present invention also concerns a multi layer structure.

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<sup>1</sup> Numbers in the margin indicate pagination in the foreign text.

## **Description**

[0001] The present invention concerns a coextrusion binder based on a cografted metallocene polyethylene and its use for producing a multi layer structure as well as the resulting structure.

[0002] The prior art disclosure in EP 802,207 already described binders based on metallocene polyethylene and cografted polypropylene. In this prior art one cografts a mixture that includes at least one polyethylene and at least one polypropylene in such a way as to compensate for the increase of viscosity of the polyethylene by lowering the viscosity of the polypropylene due to the effect of the grafting free radical producing initiator. Therefore this has nothing in common with the present invention in which one cografts a mixture of two polyethylenes.

[0003] The prior art WO/97 272759 describes a binder comprised of (a) a polyethylene of the HDPE, LLDPE, VLDPE or LDPE type, (b) 5 to 35% of a grafted metallocene polyethylene and (c) 0 to 35% of an elastomer, the metallocene polyethylene is not cografted.

[0004] These binders do not have adequate performance when hot, in particular multi layer packaging materials that contain these binders poorly withstand thermal treatments and temperature stresses such as, for example, pasteurization and hot welding.

[0005] The advantage of binders of the present invention is to

offer good resistance to these thermal treatments and various kinds of temperature stresses. Another advantage of the binders of the present invention pertains to their manufacture. These binders are most frequently prepared by grafting in the molten state and mixing also in the molten state, and one recovers the binder in the form of pellets at the outlet from an extrusion machine or any other equivalent apparatus, the applicant has found that this pelletizing was much easier than for binders of the preceding prior art.

[0006] The present invention concerns a coextrusion binder that includes:

- 5 to 35 parts of a polymer (A) itself comprised of a mixture of 80 to 20 parts of a metallocene polyethylene (A1) with density between 0.865 and 0.915 and from 20 to 80 parts of a non-metallocene LLDPE polyethylene (A2), the mixture of (A1) and (A2) being cografted by an unsaturated carboxylic acid, grafting monomer; and
- 95 to 65 parts of a polyethylene (B) chosen among homo- or copolymer polyethylenes and elastomers; the mixture of (A) and (B) being such that:
- the content of grafted unsaturated carboxylic acid is between 30 and  $10^5$  ppm;
- the MFI or melt flow index (standard ASTM D 1238 at 190°C, under 2.16 kg) is between 0.1 and 10 g/10

minutes.

[0007] According to one mode of implementation of the binder the density of the polyethylene (A2) is between 0.900 and 0.950.

[0008] According to one mode of implementation of the binder the proportion of the graft monomer is from 600 to 5000 ppm with respect to the weight of the mixture of cogenerated (A1) and (A2).

[0009] According to one mode of implementation of the binder the polyethylene (B) is a LLDPE with density between 0.910 and 0.935.

[0010] The invention also pertains to a coextrusion binder comprised of a mixture of 80 to 20 parts of a metallocene polyethylene (A1) with density between 0.965 and 0.915 and from 20 to 80 parts of a non-metallocene LLDPE polyethylene (A2), the cogenerated mixture of (A1) and (A2) being accomplished by an unsaturated carboxylic acid; the mixture of (A1) and (A2) being such that:

- the content of grafted unsaturated carboxylic acid is between 30 and  $10^5$  ppm;
- the MFI or melt flow index (standard ASTM D 1238, at 190°C, under 2.16 kg) is between 0.1 and 10 g/10 minutes.

[0011] The invention also has the goal of a multi layer structure that includes a layer that includes the binder of any one of the preceding claims and one layer (E) directly attached

to the latter:

- of a nitrogenous or oxygenated polar resin such as a resin of polyamide, aliphatic polyketone, saponified copolymer of ethylene and vinyl acetate (EVOH) or of polyester, or
- metallic.

[0012] According to one mode of implementation of the structure a layer (F) of polyolefin, or a layer of resin chosen among resins of the layer (E) or a metallic layer, is directly attached on the side of the binder.

[0013] Another goal of the invention is a rigid hollow body comprised of the structure such as described previously.

[0014] The invention also concerns a structure that includes a layer of polyolefin (F), a layer of the binder described earlier, a layer of a polyamide resin or a saponified copolymer of ethylene and vinyl acetate (EVOH), a layer of the binder defined earlier and a layer of polyolefin (F) respectively. /3

[0015] The structures are useful for manufacturing flexible or rigid packages such as small bags, bottles or large containers. One can manufacture these packages by coextrusion, lamination, and blast coextrusion.

[0016] The invention is also useful for coextruded pipes and for multi-layer gasoline containers of passenger vehicles.

[0017] The invention will now be described in its details.

[0018] With respect to (A1), we will designate by metallocene polyethylene the polymers that are obtained by the copolymerization of ethylene and alpha olefin such as, for example, propylene, butene, hexane or octene in the presence of a single site catalyst comprised generally of an atom of a metal capable of being zirconium or titanium for example, and of two alkyl cyclical molecules attached to the metal. More specifically, the metallocene catalysts are traditionally comprised of two cyclopentadienic cycles attached to the metal. These catalysts are frequently used with aluminoxanes as co-catalysts or activators, preferably methylaluminoxane (MAO). Hafnium can also be used as a metal to which the cyclopentadiene is attached. Other metallocenes can include transition metals of the groups IV A, V A and VI A. Some metals of the lanthanide series can also be used.

[0019] These metallocene polyethylenes can also be characterized by their ratio  $\overline{Mw}/\overline{Mn} < 3$  and preferably  $< 2$  in which  $\overline{Mw}$  and  $\overline{Mn}$  designate respectively the average molar mass in weight and the average molar mass in number. We also designate by metallocene polyethylene those that have a MFR (melt flow ratio) less than 6.53 and a  $\overline{Mw}/\overline{Mn}$  ratio greater than MFR - 4.63. The MFR designates the ratio of the  $MFI_{10}$  (MFI under a load of 10 Kg) to the  $MFI_2$  (MFI under a load of 2.16 Kg). Other metallocene polyethylenes are defined by an MFR equal to or

greater than 6.13 and a  $\overline{Mw}/\overline{Mn}$  ratio less than or equal to the MFR less 4.63.

[0020] Advantageously the density of (A1) is between 0.870 and 0.900.

[0021] With respect to the polyethylene (A2), it is a copolymer of ethylene and an alpha olefin of the LLDPE type (linear low density polyethylene) that is not of metallocene origin. The alpha olefins advantageously have from 3 to 30 atoms of carbon.

[0022] Some examples of alpha olefins having from 3 to 30 atoms of carbon as possible co-monomers include propylene, 1-butene, 1-pentene, 3-methyl-1-butene, 1-hexene, 4-methyl-1-pentene, 3-methyl-1-pentene, 1-octene, 1-decene, 1-dodecene, 1-tetradecene, 1-hexadecene, 1-octadecene, 1-eiocene, 1-dococene, 1-tetracocene, 1-hexacocene, 1-octacocene, and 1-triacontene. These alpha olefins can be used alone or in a mixture of two or more of them.

[0023] The density of (A2) is advantageously between 0.900 and 0.950. The MFI of (A2) is between 0.1 and 8 g/10 minutes (at 190°C under 2.16 Kg).

[0024] The mixture of (A1) and (A2) is grafted with an unsaturated carboxylic acid, that is (A1) and (A2) are cografted.

One would not depart from the scope of the invention by using a functional derivative of this acid.



[0025] Some examples of unsaturated carboxylic acids are those having from 2 to 20 atoms of carbon such as the acids acrylic, methacrylic, maleic, fumaric and itaconic. The functional derivatives of these acids include, for example, anhydrides, ester derivatives, amide derivatives, imide derivatives and metallic salts (such as salts of alkaline metals) of unsaturated carboxylic acids.

[0026] Some unsaturated dicarboxylic acids having from 4 to 10 atoms of carbon and their functional derivatives, particularly their anhydrides, are graft monomers that are particularly preferred.

[0027] These graft monomers include, for example, the acids maleic, fumaric, itaconic, citraconic, allylsuccinic, cyclohex-4-ene-1, 2-dicarboxylic, 4-methyl-cyclohex-4-ene 1,2-dicarboxylic, bicyclo (2,2,1)-hept-5-ene-2,3-dicarboxylic,, x-methylbicyclo(2,2,1)-hept-5-ene-2,3-dicarboxylic, the anhydrides maleic, itaconic, citraconic, allysuccinic, cyclohex-4-ene-1,2-dicarboxylic, 4-methylenecyclohex-4-ene-1,2-dicarboxylic, bicyclo(2,2,1)hept-5-ene-2,3-dicarboxylic, etx-methylbicyclo (2,2,1)hept-5-ene-2,2-dicarboxylic.

[0028] Some examples of other graft monomers include alkyl esters at C<sub>1</sub>-C<sub>8</sub> or some glycidyl ester derivatives of unsaturated carboxylic acids such as methyl acrylate, methacrylate of methyl, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl

methacrylate, glycidyl acrylate, glycidyl methacrylate, mono-ethyl maleate, diethyl maleate, monomethyl fumarate, monomethyl itaconate and diethyl itaconate; some amide derivatives of unsaturated carboxylic acids such as acrylamide, methacrylamide, monoamide maleic, diamide maleic, N-monoethylamide maleic, N,N-diethylamide maleic, N-monobutylamide maleic, N,N-dibutylamide fumaric, N,N-diethylamide fumaric, N-monobutylamide fumaric and N,N dibutylamide fumaric; some imide derivatives of the unsaturated carboxylic acids such as maleimide, N-butylmaleimide and N-phenylmaleimide; and metallic salts of unsaturated carboxylic acids such as sodium acrylate, sodium methacrylate, potassium acrylate and potassium methacrylate. Maleic anhydride is preferred.

[0029] Various known processes can be used to graft a graft monomer onto the mixture of (A1) and (A2). The mixture can contain the additives that are traditionally used during employment of polyolefins with contents between 10 ppm and 5%, such as anti-oxidants based on substituted phenolic molecules, UV protective agents, implementation agents such as fatty amides, stearic acid and its salts, fluorinated polymers known as agents that can prevent extrusion defects, amine based demisting agents, anti-blocking agents such as silicon dioxide or talc, main mixtures with covering agents, and nucleating agents among others.

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[0030] For example, this could be achieved by heating the polymers (A1) and (A2) at high temperature, about 150°to 300°C, in the presence or in the absence of a solvent with or without radical producing initiators. Some suitable solvents which can be used in this reaction are benzene, toluene, xylene, chlorobenzene, cumene among others. Some suitable radical producing initiators that can be used include t-butyl-hydroperoxide, cumene-hydroperoxide, di-iso-propylbenzene-hydroperoxide, di-t-butyl-peroxide, t-butyl-cumyl-peroxide, dicumylperoxide, 1,3-bis-(t-butylperoxy-isopropyl)benzene, acetyl-peroxide, benzoylperoxide, iso-butyryl-peroxide, bix-3,5,5-trimethyl-hexanoyl-peroxide, and methylethyl-ketone-peroxide.

[0031] In the mixture of (A) and (A2) modified by grafting that was obtained in the aforementioned manner, the graft monomer can be selected in a suitable way but it is preferably from 0.1 to 10%, and better yet 600 ppm to 5000 ppm, with respect to the weight of the graft (A1) and (A2).

[0032] The quantity of the graft monomer is determined by determining the dosage of the succinic functions by IRTF spectroscopy. The MFI of (A) that is of (A1) and (A2) having been cografted, is preferably 0.1 to 10 g/10 minutes.

[0033] As for the polyethylene (B), this is a homopolymer polyethylene or a copolymer of ethylene with a monomer chosen

among the alpha olefins, esters of unsaturated carboxylic acids of vinyl esters of saturated carboxylic acids. The alpha olefins were defined earlier. The esters of unsaturated carboxylic acids are, for example, the (meth)acrylates of alkyl in which the alkyl has from 1 to 24 atoms of carbon. Some examples of acryl acrylate or alkyl methacrylate that can be used are in particular methacrylate, ethyl acrylate, n-butyl acrylate, isobutyl acrylate, 2-ethylhexyl acrylate. The vinyl esters of saturated carboxylic acids are, for example, the acetate or the propionate of vinyl. (B) can be a HDPE, LDPE, LLDPE, VLDPE polyethylene or a metallocene PE.

[0034] (B) can also be a polymer with elastomeric nature, that is it can be a (i) elastomer in the meaning of ASTM D412, which signifies a material that can be drawn at ambient temperature to two times its length, held in this way for 5 minutes then returned to less than 10% of its initial length after having been relaxed or (ii) a polymer that does not have exactly the preceding characteristics but that can be drawn and returned approximately to its initial length. As an example we can mention:

- the EPR (ethylene propylene rubber also designated EPM) and the EPDM (ethylene propylene diene),
- the styrene elastomers such as SBR (styrene-butadiene-rubber), the styrene/butadiene/styrene block copolymers

(SBS), the styrene/ethylene/butadiene/styrene block copolymers (SEBS) and the styrene/isoprene/styrene block copolymers (SIS).

[0035] Advantageously, (B) is a LLDPE polyethylene with density between 0.910 and 0.935 or even a PEHD with density between 0.935 and 0.950.

[0036] Advantageously, the proportions of (A) and (B) are 10 to 30 parts of (A) for 90 to 70 of (B) respectively.

[0037] According to a second form the invention concerns a composition comprised of the single mixture of (A1) and (A2) that are cogenerated intended to be diluted in a polyethylene or an elastomer (B). Indeed, the applicant has discovered that one can adjust the concentration of the final binder (that is the mixture of (A) and (B)) according to different usages starting from (A) by incorporation or mixing of pellets with (B).

[0038] The binders of the invention are useful for multilayer structures as, for example, films, sheets, tubes and hollow bodies such as gasoline tanks.

[0039] The multilayer structure of the present invention includes the layer that includes the preceding binder, and a layer (E) of oxygenated or nitrogenous polar resin, or a metal layer.

[0040] Some examples of preferred polar resins in the layer other than the binder are the resins of polyamide, and aliphatic

polyketone, a saponified copolymer of ethylene and vinyl acetate, and polyesters.

[0041] More specifically, they include long chain synthetic polyamides having structural patterns of the amide group in the main chain, such as PA-6, PA-6.6, PA-6.10, PA-11, PA-6/6.6 and PA-12; a saponified copolymer of ethylene and vinyl acetate having a degree of saponification of about 90 to 100% in moles, obtained by saponifying a vinyl ethylene/acetate copolymer having an ethylene content of about 15 to about 60% in moles; some polyesters such as polyethylene-terephthalate, polybutylene-terephthalate, polyethylene naphthenate, some mixtures of these resins, or even some aromatic polyesters such as polymer liquid crystals.

[0042] The metal layer can be, for example, a sheet, a film or a sheet of a metal such as aluminum, iron, copper, tin and nickel, or an alloy containing at least one of these metals as the main ingredient. The thickness of the film or of the sheet can be appropriately chosen and it is, for example, about 0.01 to about 0.2 mm. It is the current practice to degrease the surface of the metal layer before laminating the binder of the invention to it. The layer of oxygenated or nitrogenous polar resin (E) can also contain some known additives in the traditional quantity. /5

[0043] The invention also concerns a structure that includes a

layer (F) of polyolefin, a layer of binder of the invention, and a layer (E) of nitrogenous or oxygenated polar resin or a metal layer respectively.

[0044] The different layers of the structures of the invention can contain additives such as loads, stabilizing agents, lubricating agents, anti-static agents, and fire proofing agents.

[0045] The structures of the invention can be manufactured by known procedures of coextrusion, blast extrusion, and thermoplastic techniques.

[0046] Tables 1 and 2 below summarize the compositions of binders, the percentages being percentages by weight.

[0047] By comparing the stripping force values of table 1, one finds that example 4 according to the invention has adhesive properties at 23°C that are better than the compared values 2 and 3 and some adhesive properties that are identical to or superior to the adhesive properties of comparable values 1 to 3 in a range of temperatures from 50 to 90°C.

[0048] By comparing the stripping force values of table 2 one finds that example 8 according to the invention has some adhesive properties at 23°C and 50°C that are better than the comparable values of 6 and 7 and some adhesive properties superior to the adhesive properties of comparable values 5 to 7 in a range of temperatures from 70 to 90°C.

[0049] One concludes that the cogafting of a mixture of two

types of PE (metallocene and non-metallocene) allows one, through synergy, to improve the adhesive properties of the binders.



**Table 1**

		Comparison 1	Comparison 2	Comparison 3	Example
Polymer (A)		A1 grafted alone	A2 grafted alone	(A1 grafted) + (A2 grafted)	(A1+A2) gr
	Type of PE	metallocene	LLDPE	(metallocene) + (LLDPE)	(metallocene
	Density	0.870	0.920	(0.870) + (0.920)	(0.870+0.
	Comonomer	1-octene	1-butene	(1-octene) + (1-butene)	(1-octene+1-
	Composition	100% A1	100% A2	(50% A1) + (50% A2)	(50% A1+50
	Rate of grafting	0.6%	0.7%	0.65%	0.7%
	MFI (g/10 min) 190°C-2.16 kg	2.0	0.5	1.1	1.2
	Proportion of (A)	15%	15%	15%	15%
<b>Polyethylene (B)</b>	Type of PE	LLDPE	LLDPE	LLDPE	LLDPE
	Comonomer	1-butene	1-butene	1-butene	1-butei
	Density	0.910	0.910	0.910	0.910
	Proportion of (B)	85%	85%	85%	85%
<b>Resistance to stripping* (N/15 mm)</b>	T=23°C	12.0	8.5	9.2	11.5
	T=50°C	8.3	4.8	5.6	8.3
	T=70°C	6.2	3.0	3.8	6.9
	T=80°C	4.2	2.2	2.9	6.0
	T=90°C	0	0.8	0.8	4.1

\* stripping test carried out between layer of binder and layer of EVOH in a coextruded film that contains 5 layers (PE/binder/EVOH/binder/PE with PE having density of 0.935 and EVOH with 30% ethylene) with thickness in micrometers respectively of 80/10/10/10/80, at a temperature T and stripping speed of 200 mm/min.

**Table 2**

		<b>Comparison 5</b>	<b>Comparison 6</b>	<b>Comparison 7</b>	<b>Example</b>
<b>Polymer (A)</b>		A1 grafted alone	A2 grafted alone	(A1 grafted)+(A2 grafted)	(A1+A2) gr
	Type of PE	metallocene	LLDPE	(metallocene) + (LLDPE)	(metallocene
	Density	0.890	0.930	(0.890)+(0.930)	(0.890+0.
	Comonomer	1-octene	1-butene	(1-octene)+(1- butene)	(1-octene+1-
	Composition	100% A1	100% A2	(50% A1)+(50% A2)	(50% A1+50
	Rate of grafting	0.8%	0.7%	0.75%	0.7%
	MFI (g/10 min) 190°C-2.16 kg	1.0	0.7	0.8	0.9
	Proportion of (A)	15%	15%	15%	15%
<b>Polyethylene (B)</b>	Type of PE	LLDPE	LLDPE	LLDPE	LLDPE
	Comonomer	1-butene	1-butene	1-butene	1-butene
	Density	0.920	0.920	0.920	0.920
	Proportion of (B)	85%	85%	85%	85%
<b>Resistance to stripping* (N/15 mm)</b>	T=23°C	13.1	3.5	5.8	13.0
	T=50°C	9.4	3.2	4.6	9.2
	T=70°C	7.0	2.9	3.4	7.6
	T=80°C	5.0	2.4	2.6	6.2
	T=90°C	1.2	1.3	1.2	4.3

\* stripping test carried out between layer of binder and layer of EVOH in a coextruded film that contains 5 layers (PE/binder/EVOH/binder/PE with PE having density of 0.935 and EVOH with 30% ethylene) with thickness in micrometers respectively of 80/10/10/10/80, at a temperature T and stripping speed of 200 mm/min.

#### CLAIMS

1. Coextrusion binder that includes:

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- 5 to 35 parts of a polymer (A) itself comprised of a

mixture of 80 to 20 parts of a metallocene polyethylene (A1) with density between 0.865 and 0.915 and from 20 to 80 parts of a non-metallocene LLDPE polyethylene (A2), the mixture of (A1) and (A2) being cogenerated by an unsaturated carboxylic acid, graft monomer, and

- 95 to 65 parts of a polyethylene (B) chosen among homo- or copolymer polyethylene and elastomers; the mixture of (A) and (B) being such that:
  - the content of graft unsaturated carboxylic acid is between 30 and  $10^5$  ppm;
  - the MFI or melt flow index (standard ASTM D 1238, at 190°C, under 2.16 kg) is between 0.1 and 10 g/10 minutes.
2. Binder according to claim 1 in which the density of the polyethylene (A2) is between 0.900 and 0.950.
  3. Binder according to any of the preceding claims in which the proportion of the graft monomer is from 600 to 5000 ppm with respect to the weight of the mixture of cogenerated (A1) and (A2).
  4. Binder according to any of the preceding claims in which the polyethylene (B) is a LLDPE with density between 0.910 and 0.935.
  5. Coextrusion binder comprised of a mixture of 80 to 20 parts of a metallocene polyethylene (A1) with density between 0.865 and

0.915 and from 20 to 80 parts of non-metallocene LLDPE polyethylene (A2), the mixture of (A1) and (A2) being cografted by an unsaturated carboxylic acid; the mixture of (A1) and (A2) being such that:

- the content of graft unsaturated carboxylic acid is between 30 and  $10^5$  ppm;
- the MFI or melt flow index (standard ASTM D 1238, at 190°C, under 2.16 kg) is between 0.1 and 10 g/10 minutes.

6. Multi layer structure that includes one layer that includes the binder of any one of the preceding claims and a layer (E) attached to the latter:

- of a nitrogenous or oxygenated polar resin such as a resin of polyamide, aliphatic polyketone, saponified copolymer of ethylene and vinyl acetate (EVOH) or with polyester, or
- metallic.

7. Structure according to claim 6 in which a layer (F) of polyolefin, or a layer of resin chosen among resins of the layer (E) or a metallic layer is directly attached on the side of the binder.

8. Rigid hollow body comprised of the structure according to any of the claims 6 and 7.